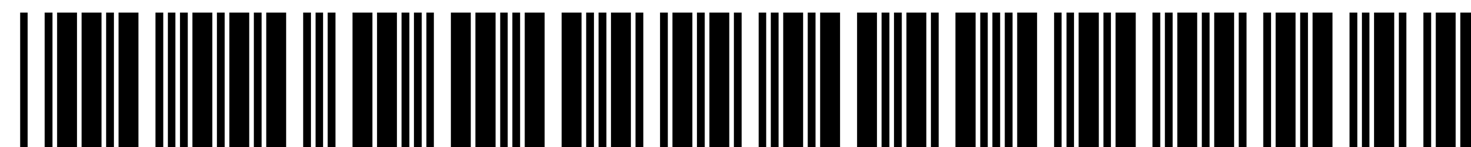

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(54) **SEMICONDUCTOR LASER APPARATUS AND METHOD FOR MANUFACTURING THE SAME**

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(51) **Int. Cl.**[7] **H01S 3/04**; H01S 5/00
(52) **U.S. Cl.** **372/36**; 372/43
(58) **Field of Search** 372/36, 43–49; 257/675, 707

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(57) **ABSTRACT**

A base frame, a laser device mounting frame, and a lead frame are formed by stamping and bending one metal plate. A reference plane is constituted by reference plane portions of the flat base frame, and metal plates for heat dissipation and reinforcement are further attached to the reference plane to provide high strength and heat dissipation though the present apparatus is a flame type laser apparatus. Also, a laser device is mounted on the laser device mounting frame, and the surrounding thereof except the light emitting side is molded with a mold resin. This eliminates the need for a cap for protecting the laser device and a wire, and enables collective production. More specifically, collective mass production is enabled by forming a frame by stamping out from one metal plate and molding the frame with resin without use of a cap.

15 Claims, 5 Drawing Sheets

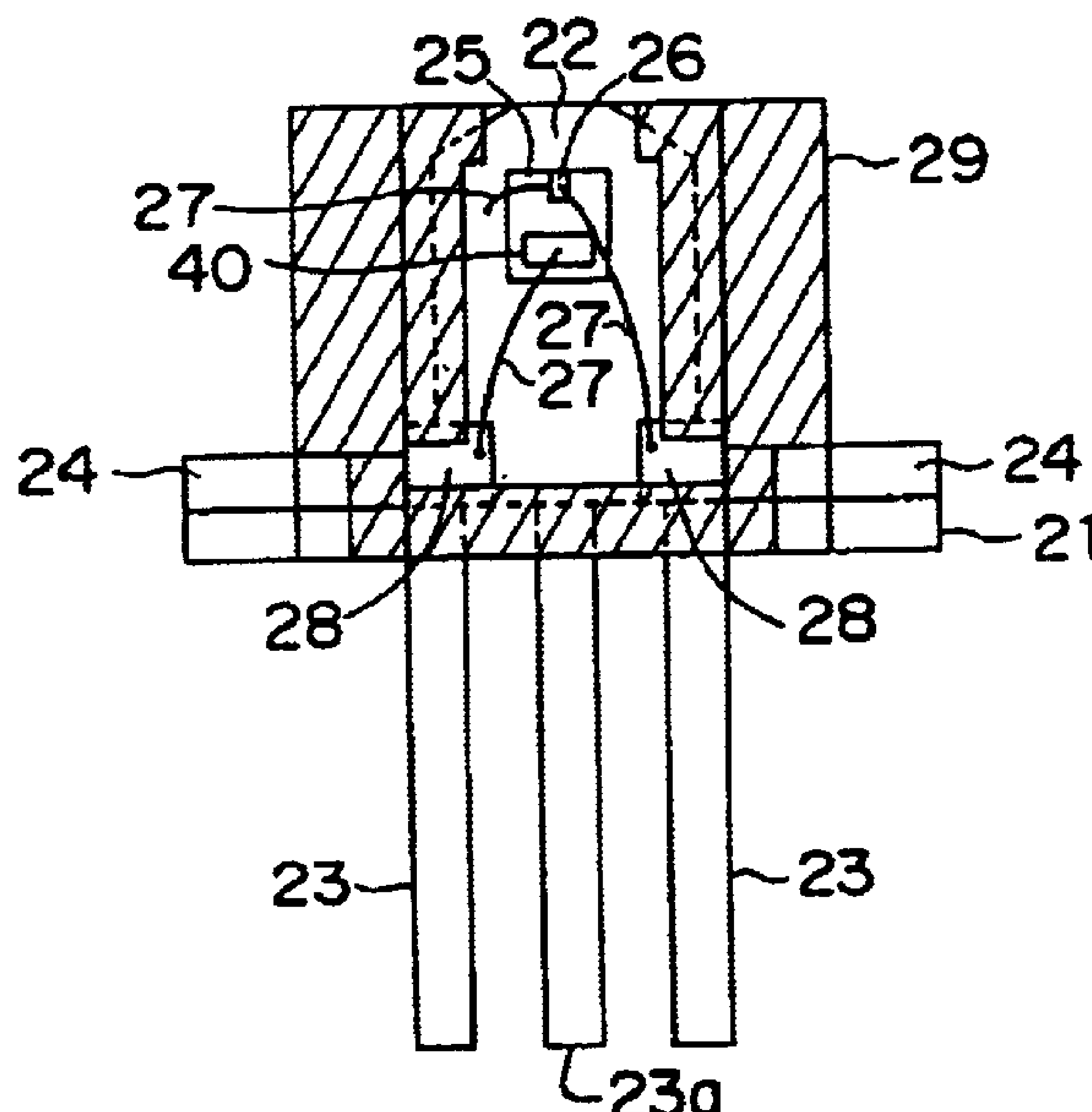


Fig. 1A

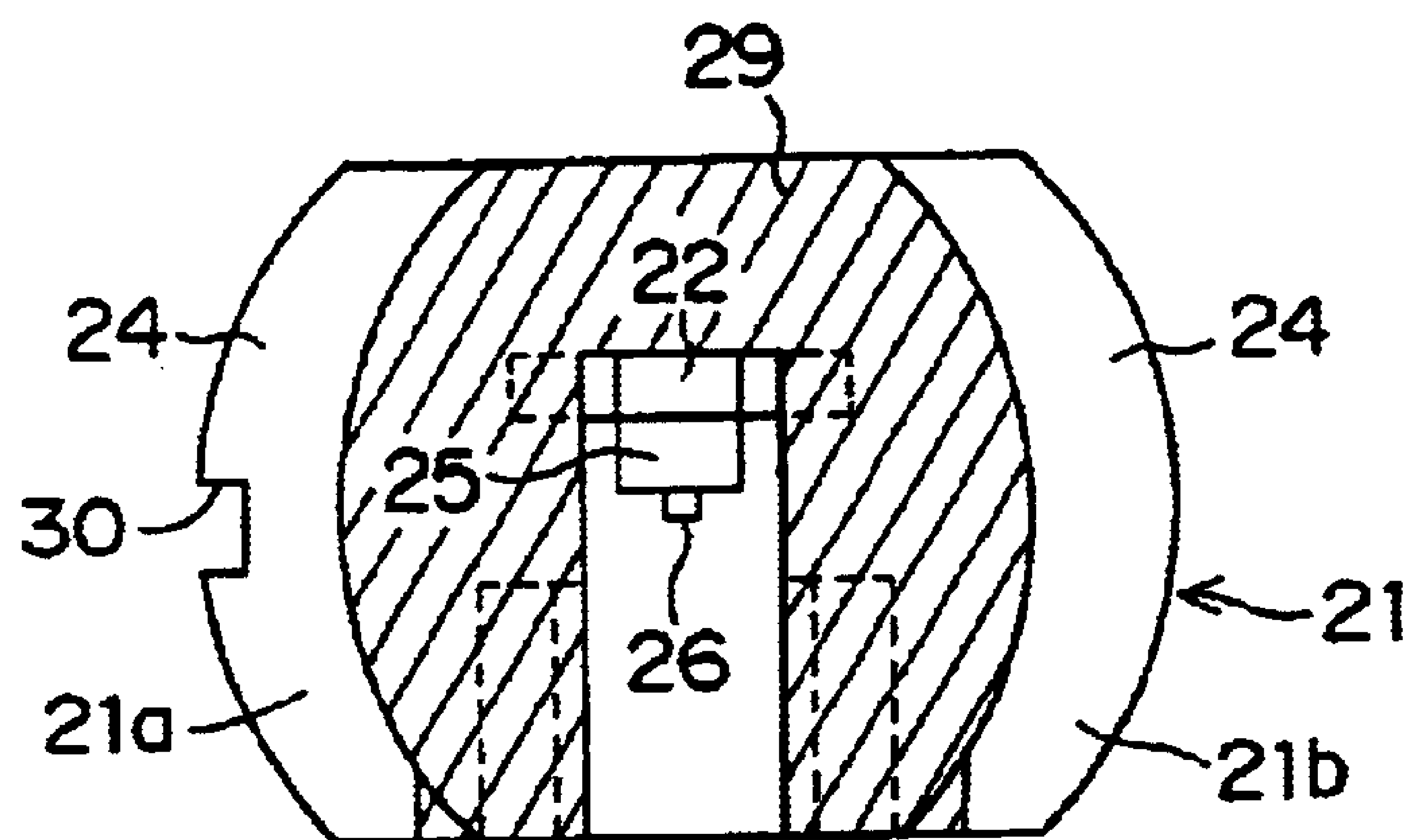


Fig. 1B

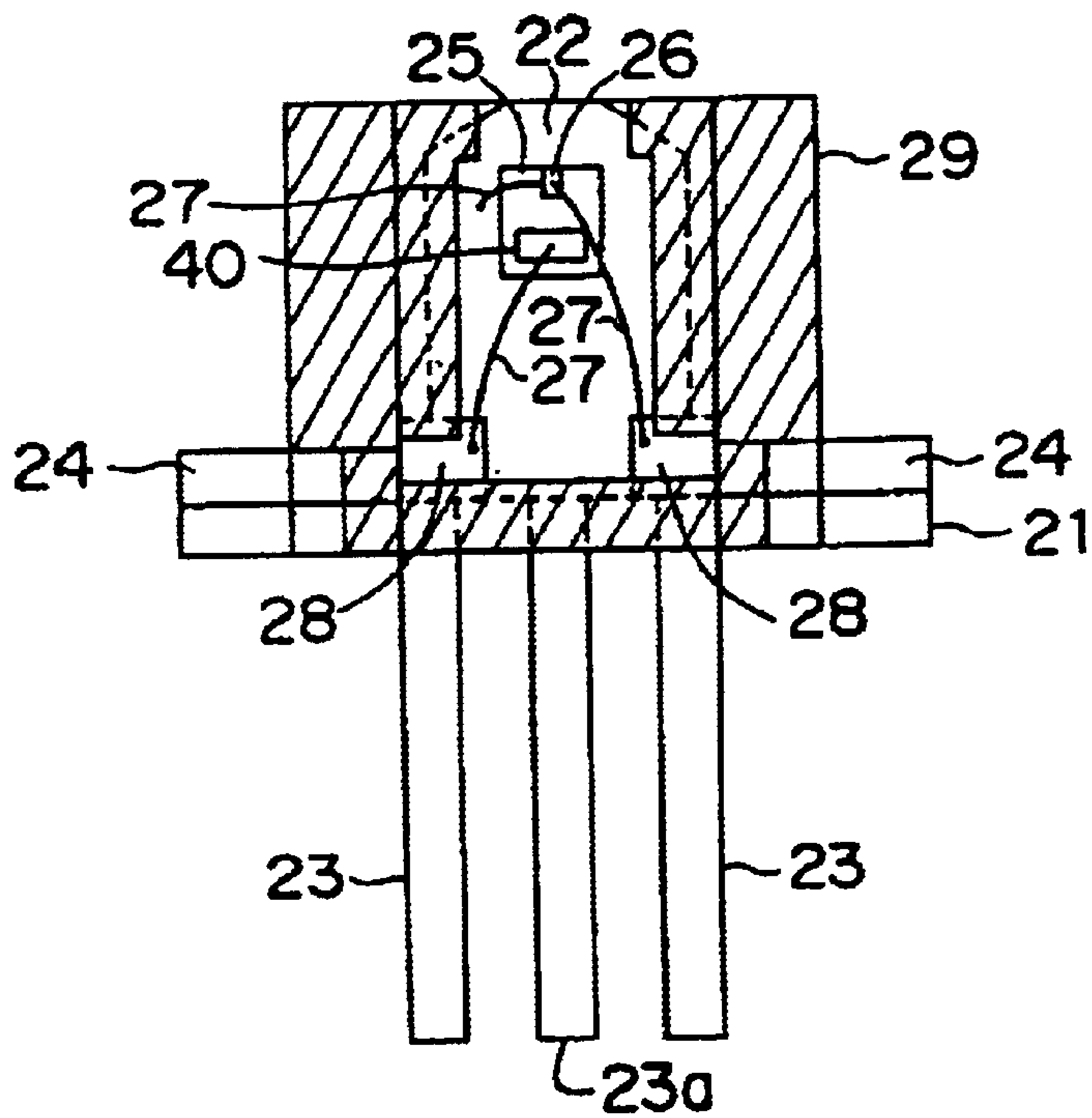


Fig. 1C

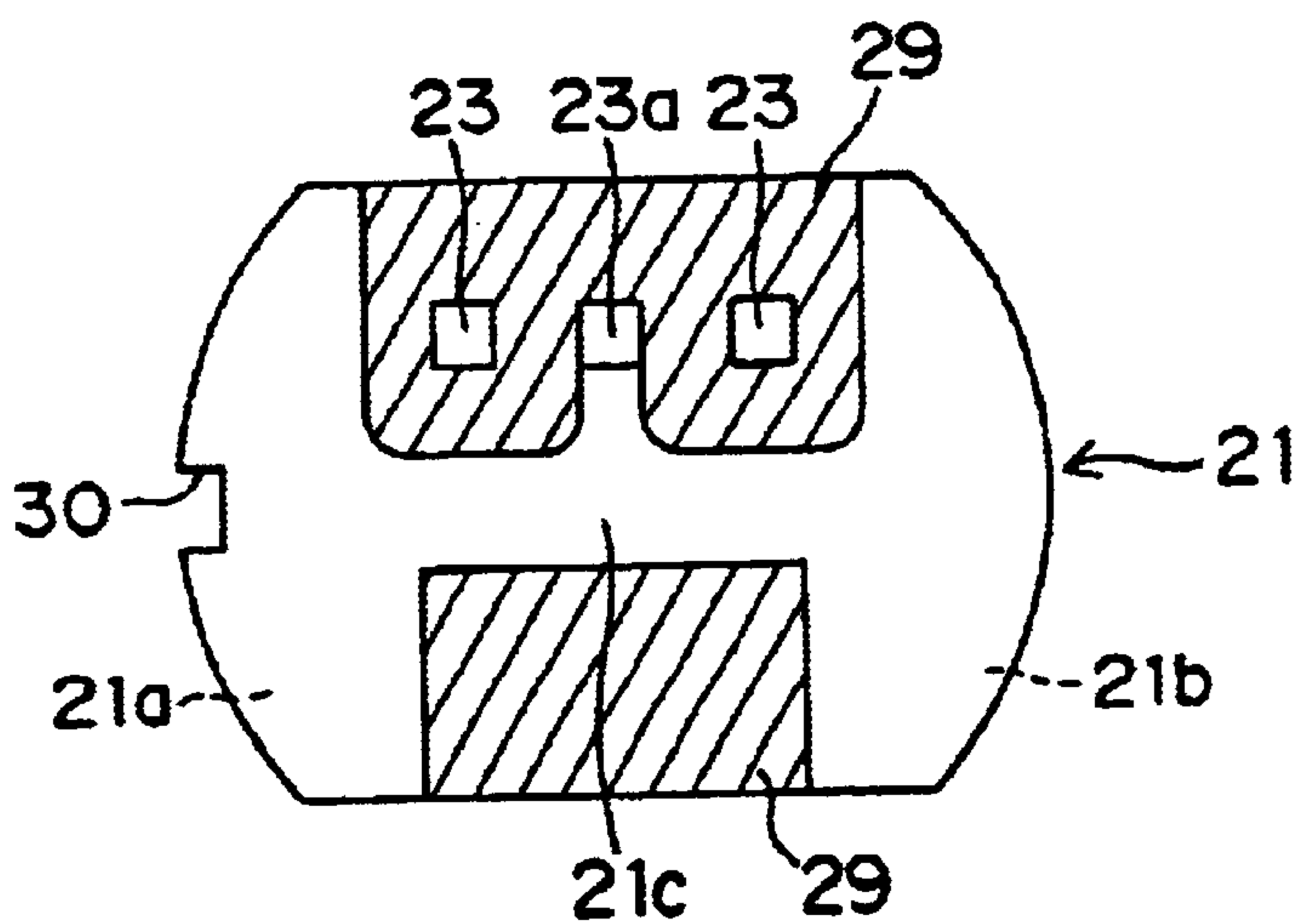


Fig.2A

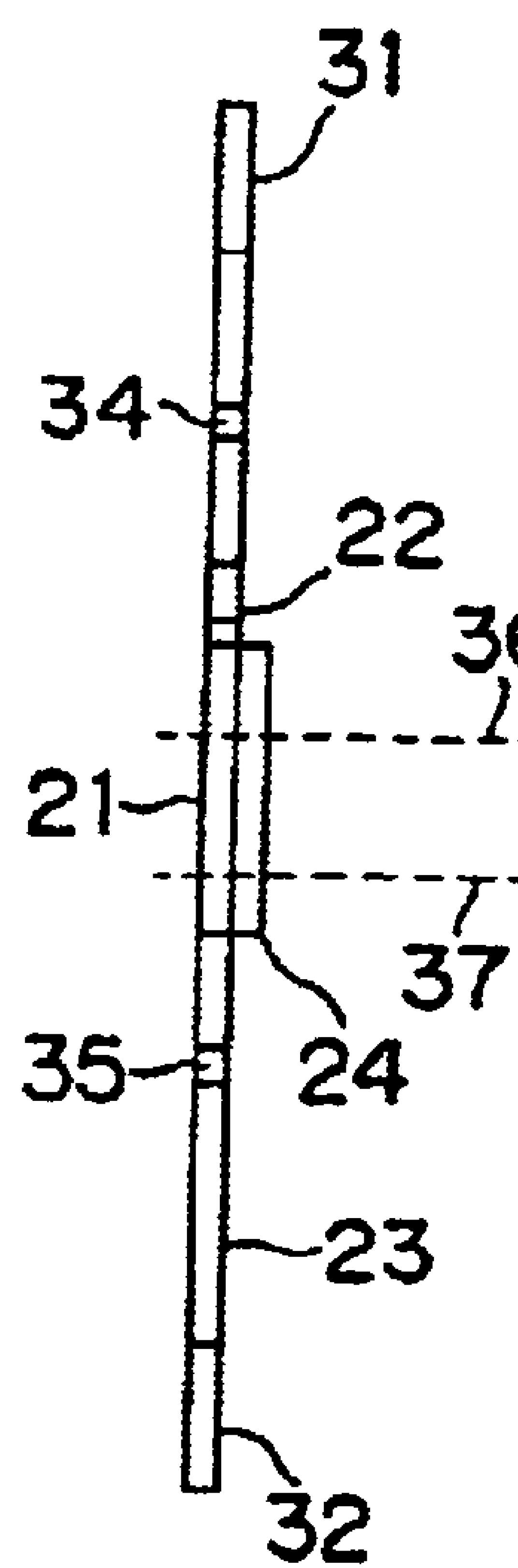


Fig.2B

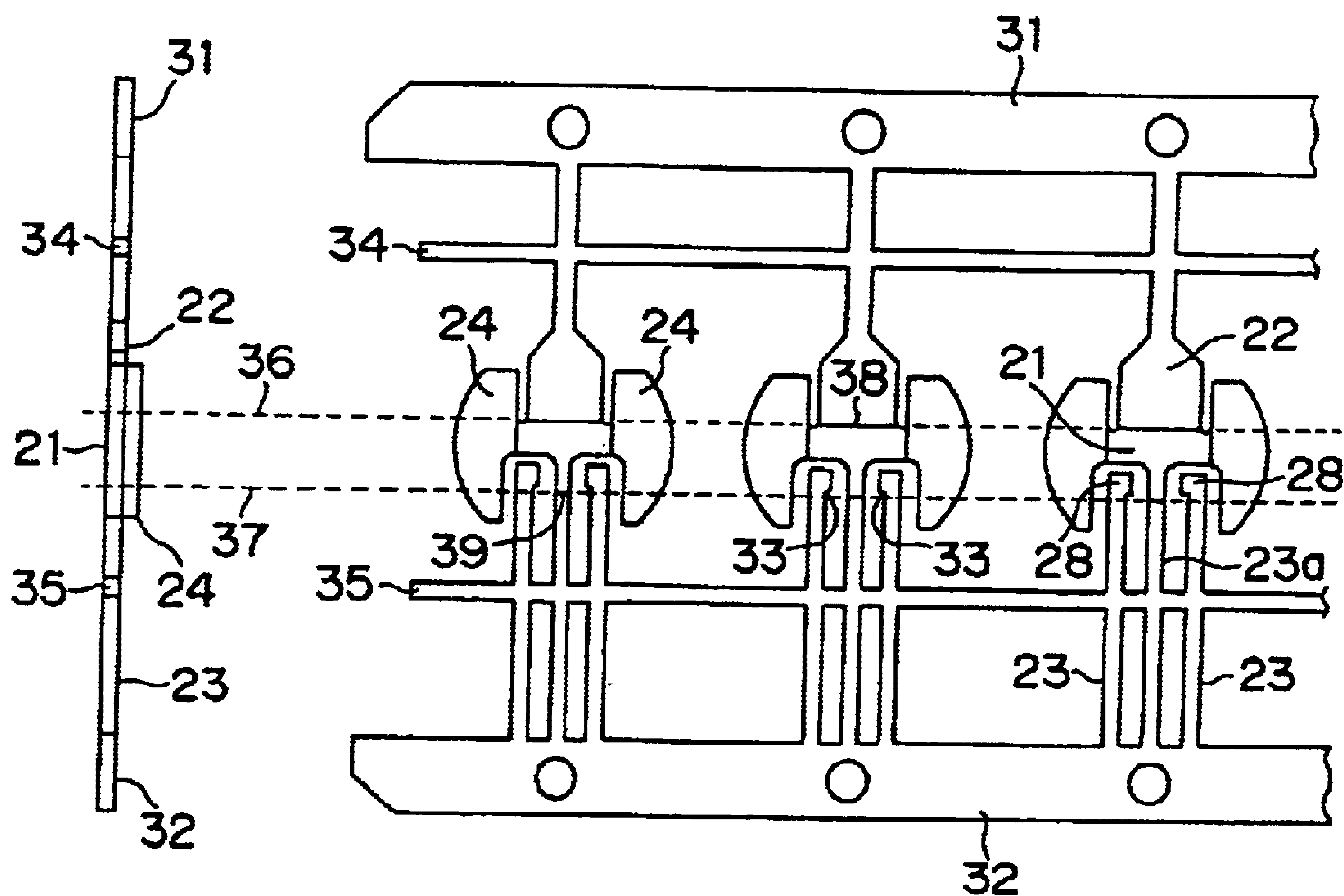


Fig.3

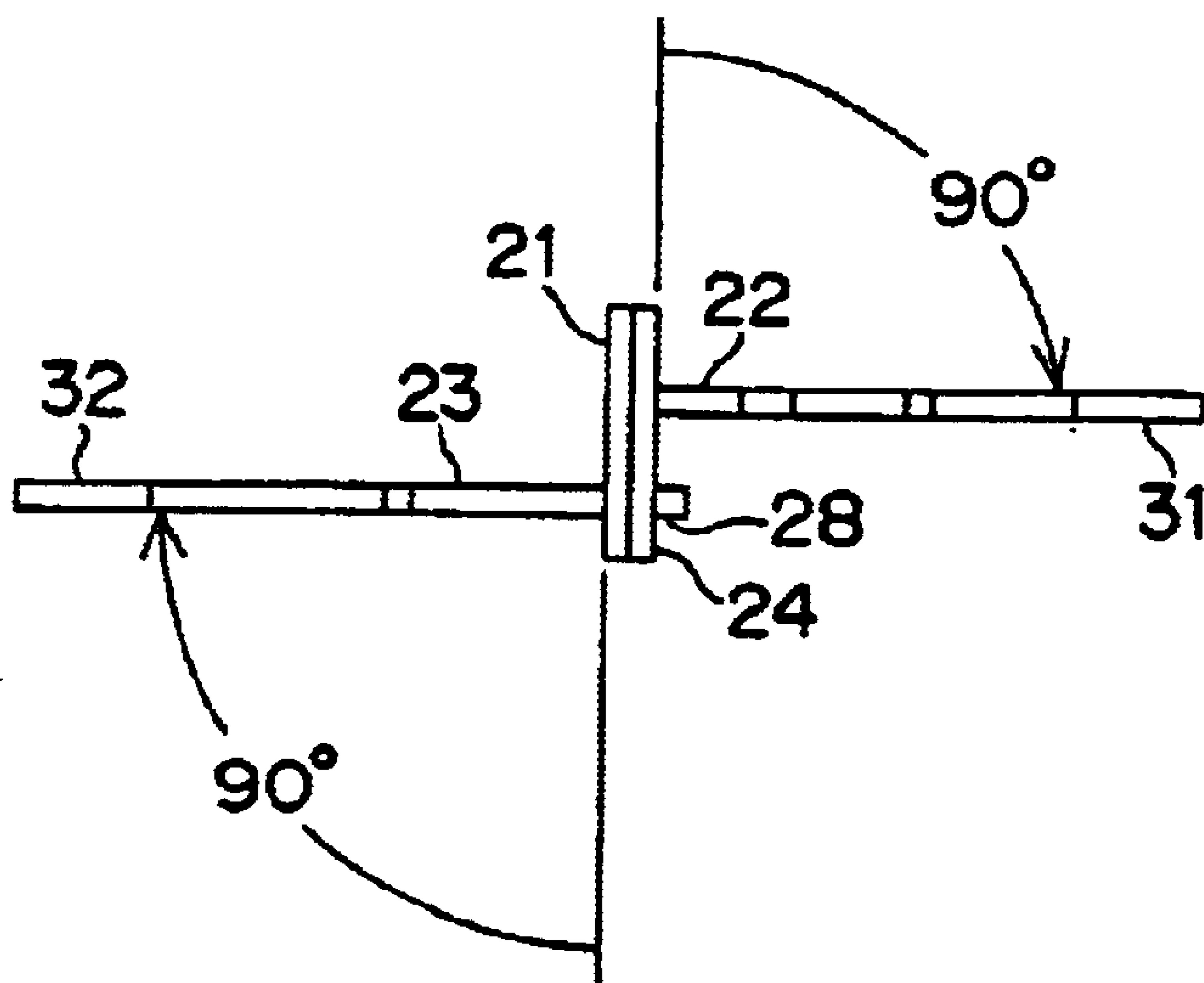


Fig.4B

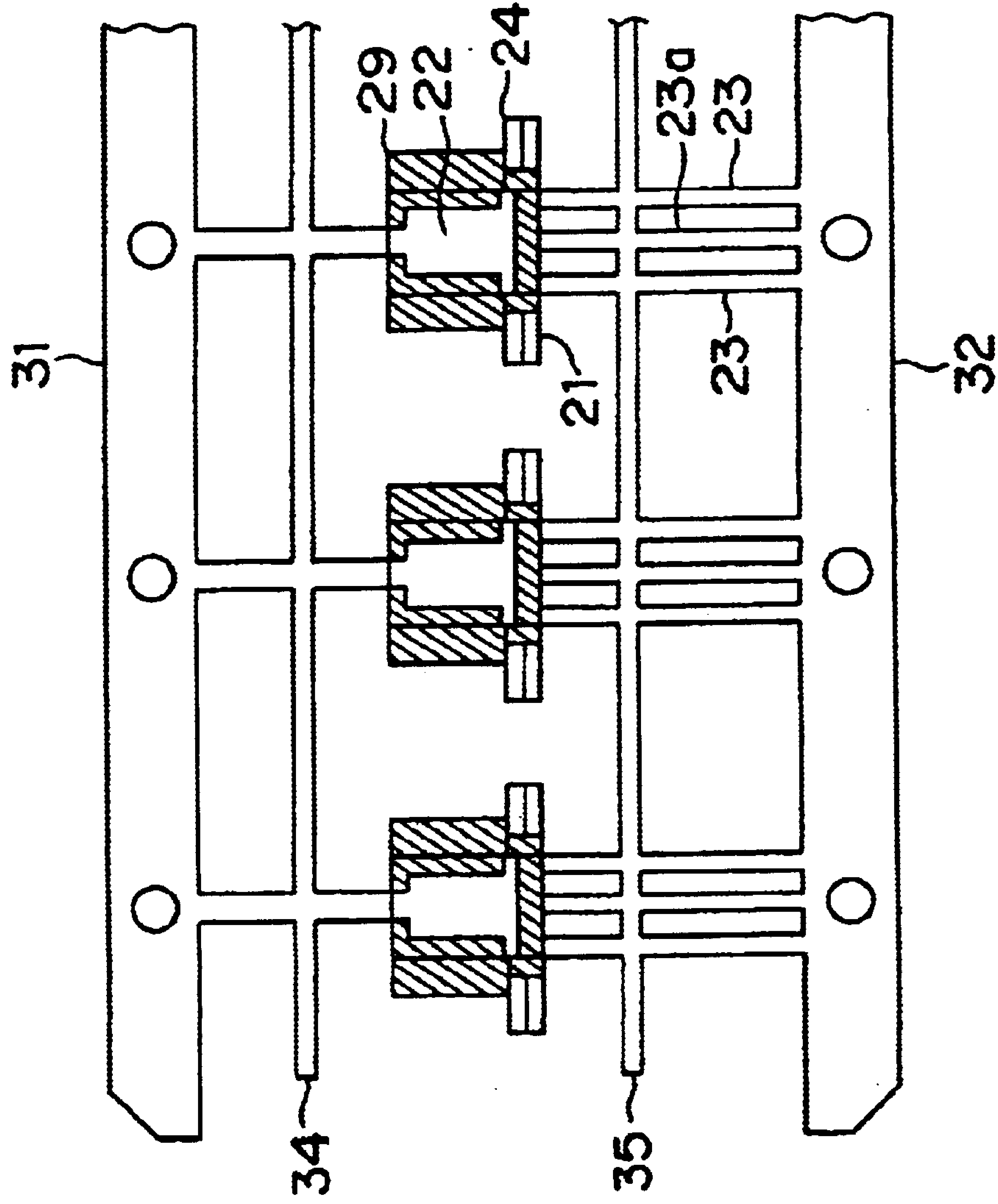


Fig.4A

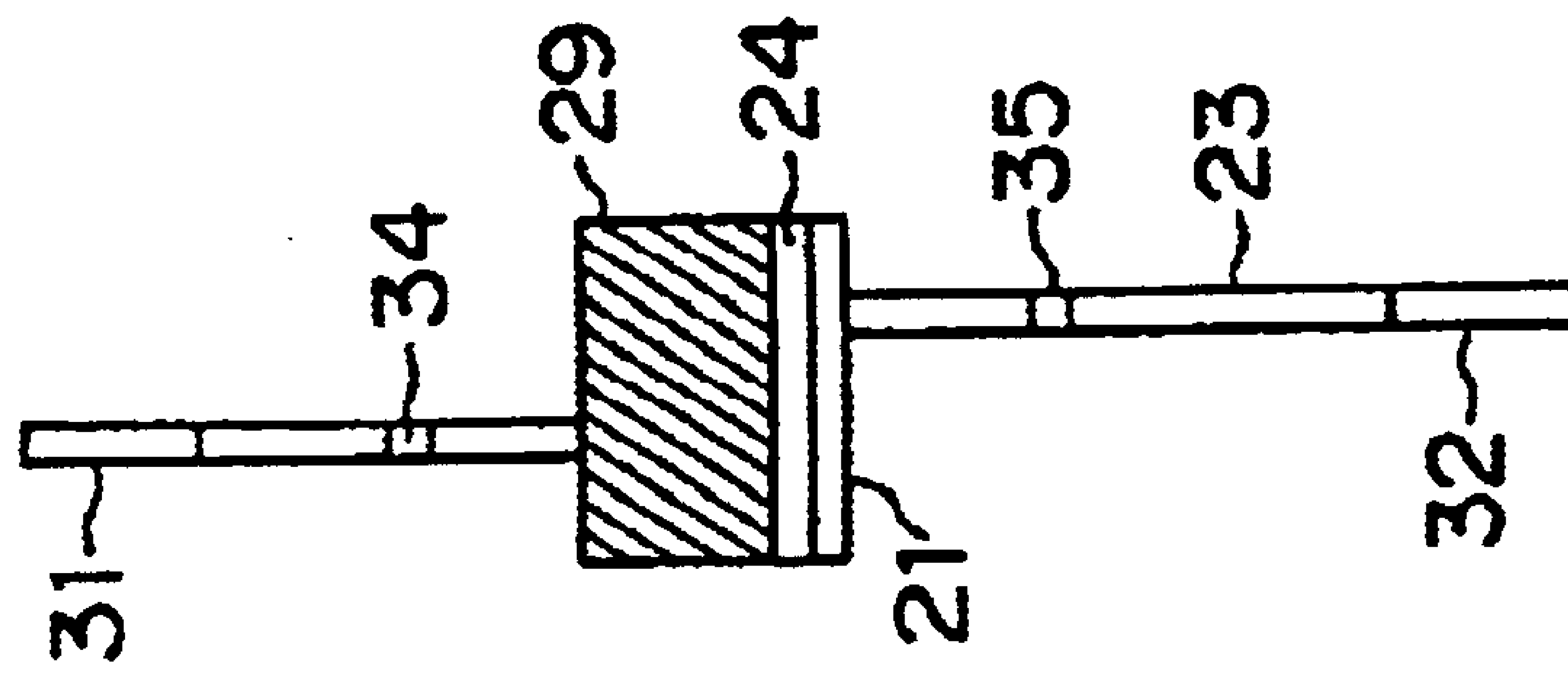


Fig. 5 PRIOR ART

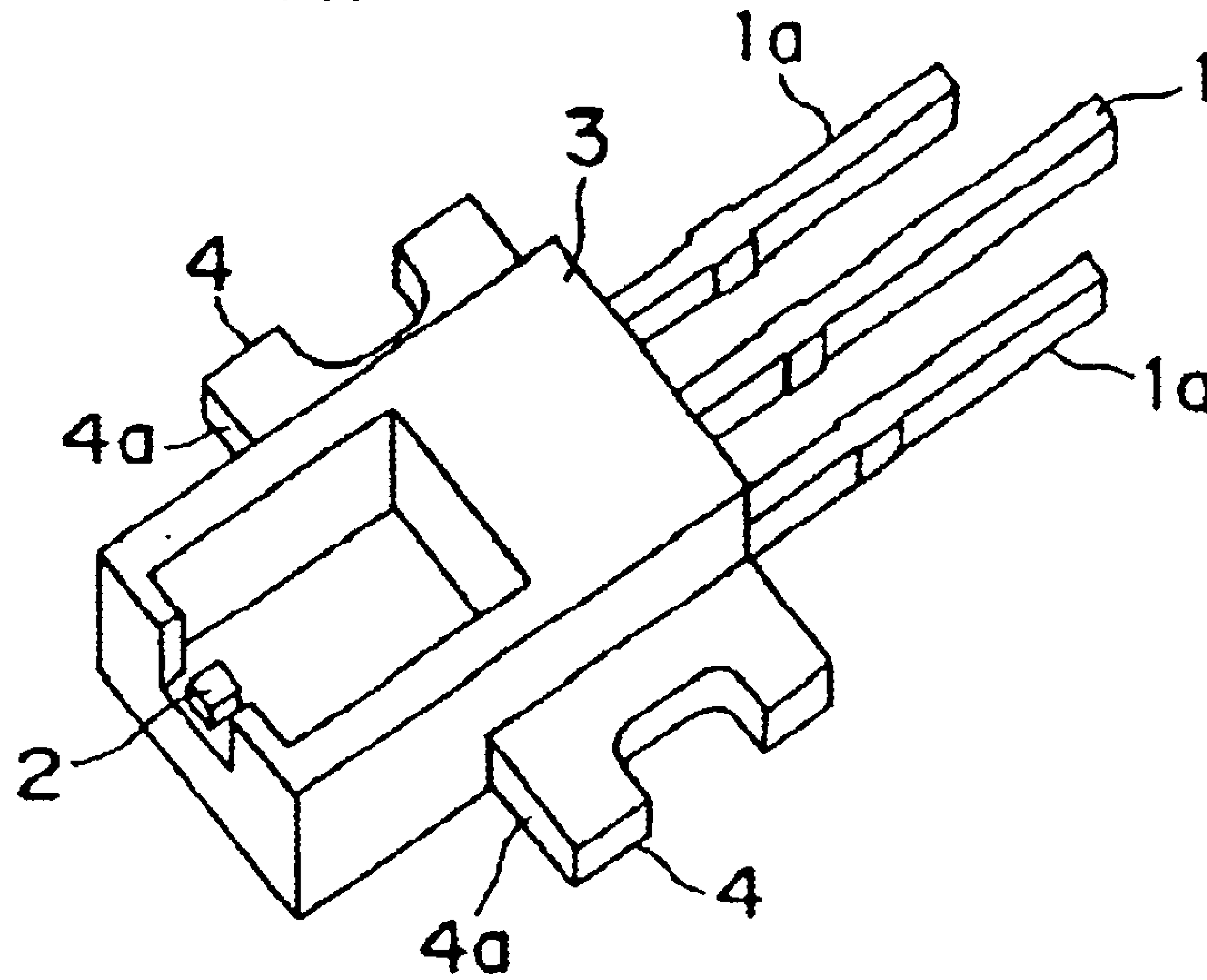


Fig. 6 PRIOR ART

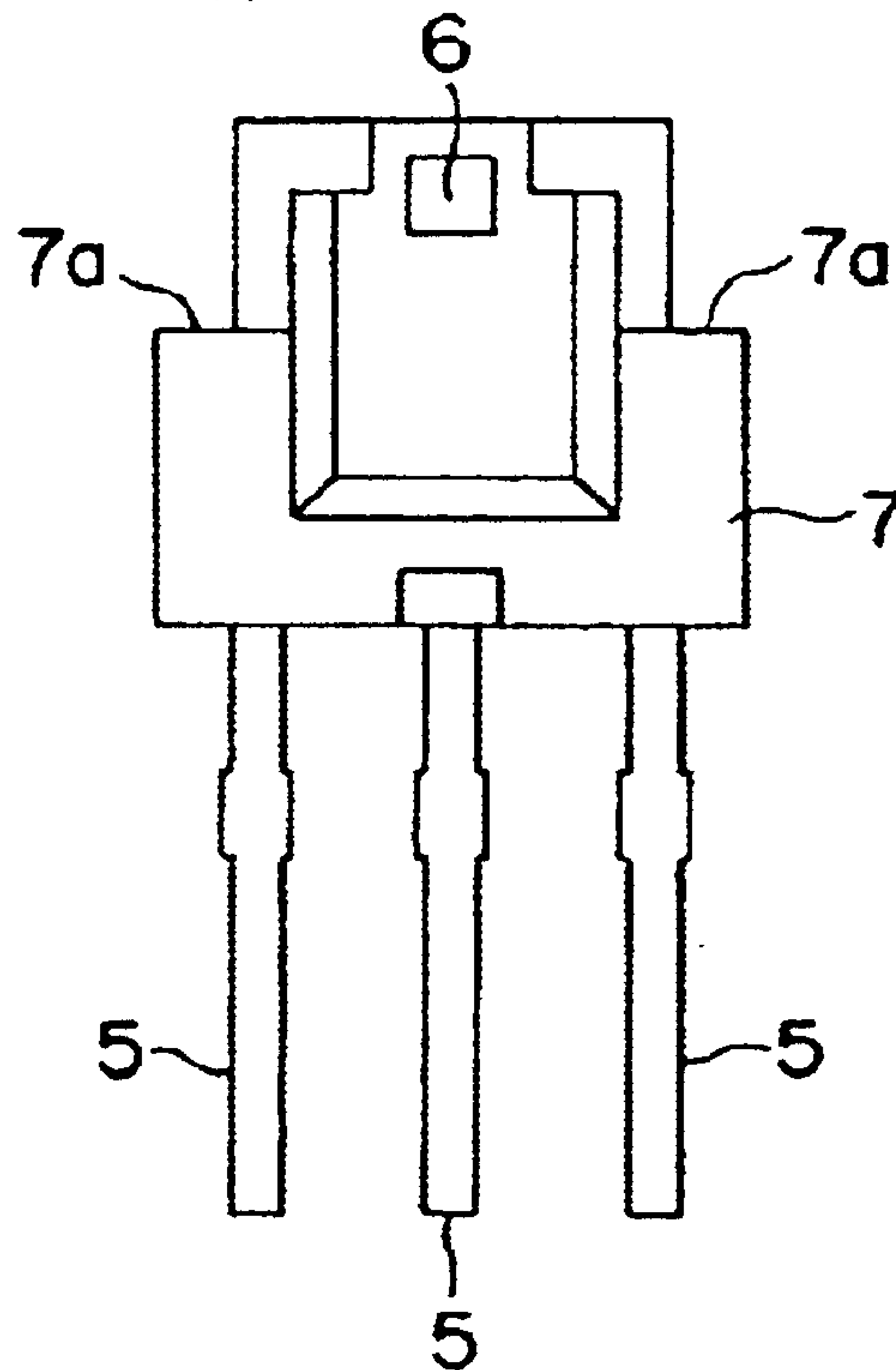
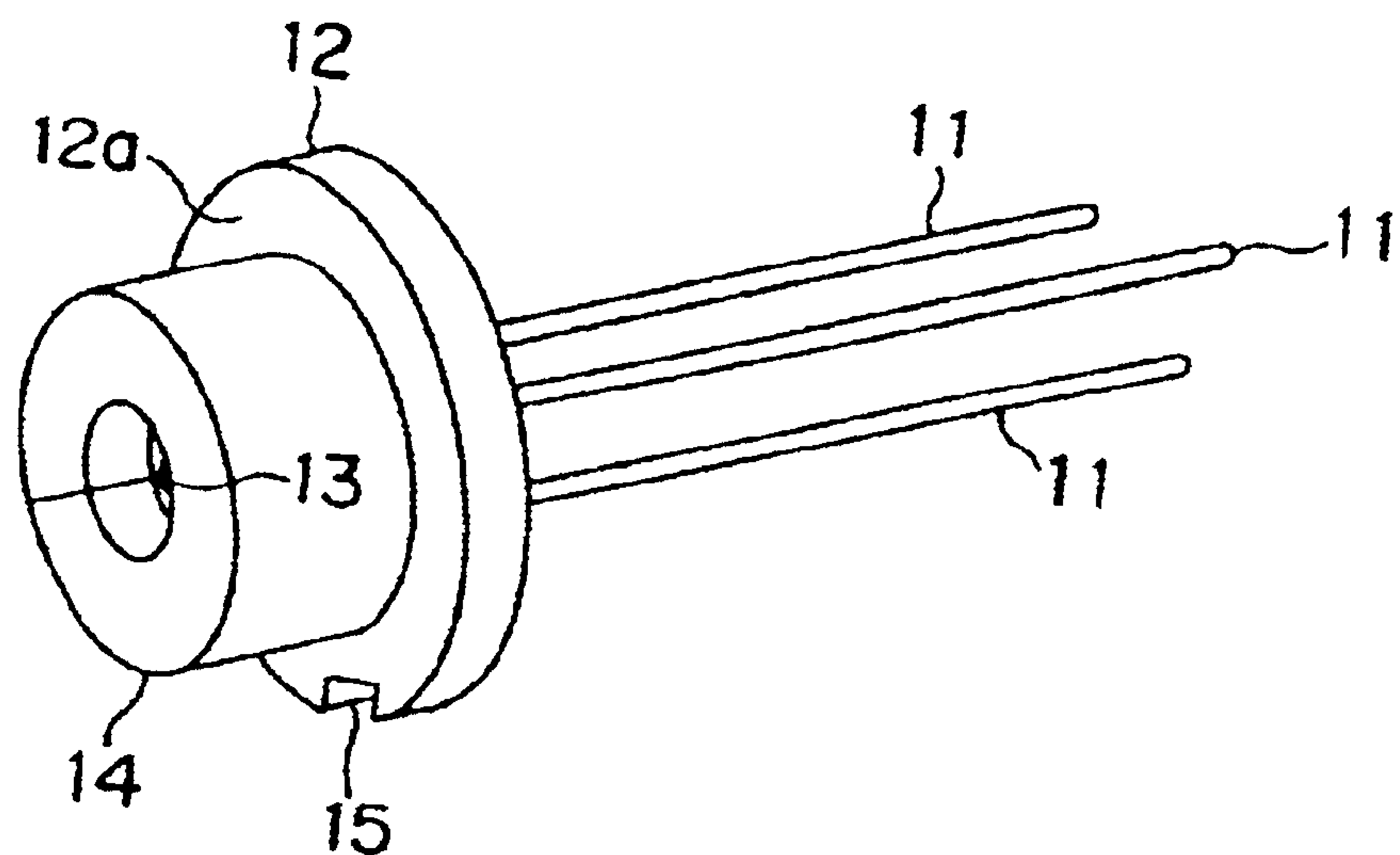


Fig. 7 PRIOR ART



SEMICONDUCTOR LASER APPARATUS AND METHOD FOR MANUFACTURING THE SAME

BACKGROUND OF THE INVENTION

The present invention relates to a semiconductor laser apparatus for use as a light source for reading signals from optical discs including CD (Compact Disc), CD-R (CD Recordable), DVD (Digital Versatile Disc) and DVD-R (DVD Recordable), and a method for manufacturing the same.

Conventionally, as an assembly structure of the semiconductor laser apparatus, there have been a frame type laser apparatus and a Φ5.6 can type laser apparatus. Hereinbelow, the both apparatuses will be roughly described.

(1) Frame Type Laser Apparatus

(1) As shown in FIG. **5**, the apparatus is structured such that on the top end of a metal lead frame **1** functioning as a lead terminal, a laser device **2** is mounted, and a mold resin **3** is used for molding. Part of a lead frame **1***a* positioned in both side portions is protruded from the lateral face of the mold resin **3** to lateral direction to constitute a plate-shaped portion **4**, and one end face **4***a* of the plate-shaped portion **4** constitutes a reference plane (eyelet).

(2) As shown in FIG. **6**, similar to the case (1), the apparatus is structured such that on the top end of a metal lead frame **5** functioning as a lead terminal, a laser device **6** is mounted, and a mold resin **7** is used for molding. In this case, one end face **7***a* of the mold resin **7** constitutes a reference plane (eyelet).

(2) Φ5.6 Can Type Laser Apparatus

As shown in FIG. **7**, the apparatus is structured such that a laser device **13** is mounted, via a heat sink (unshown), on a top face **12***a* of a stem **12** made of a circular metal block having a lead terminal **11** protruding from a bottom face, and after the laser device **13** is wire-bonded to the lead terminal **11**, the laser device **13** and a wire (unshown) are covered with a protecting cap **14**. In this case, the top face **12***a* of the stem **12** constitutes a reference plane. It is noted that reference numeral **15** denotes a cutting for positioning.

However, the above-described conventional assembly structures of the semiconductor laser apparatuses suffer a following problem.

(a) Frame Type Laser Device

(i) In the case of the frame type laser apparatus as shown in FIG. **5**, the plate-shaped portion **4** protruding from the lateral face of the mold resin **3** has a constant thickness. Consequently, the area of the reference plane constituted by the one end face **4***a* of the plate-shaped portion **4** is determined by the thickness of the plate-shaped portion **4**, which causes a problem that the strength of the reference plane is not fully secured and therefore heat dissipation is not sufficient.

(ii) In the case of the frame type laser apparatus as shown in FIG. **6**, the reference plane is constituted by the one end face **7***a* of the mold resin **7**. Consequently, there is a problem that the reference plane is lower in strength than that of a metal reference plane, and also the reference plane has expansion and shrinkage due to temperature change, which decreases accuracy as a reference plane. Further, there is another problem that heat dissipation is not fully secured as it is limited by the thickness of the lead frame **5**.

(b) Φ5.6 Can Type Laser Apparatus

As shown in FIG. **7**, the reference plane and the heat dissipation portion are constituted by one plane of a metal

block called the stem **12**. Consequently, the strength and the heat dissipation of the reference plane is superior to those of the above-described frame type laser apparatus. However, since assembly is conducted by using the cap **14** for protecting the laser device **13** and the wire against the stem **12** made of a circular metal block, individual manufacturing is necessary whether in the case of a package itself or a final product, which decreases productivity and makes the apparatus unsuitable for mass collective production

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a semiconductor laser apparatus capable of securing sufficient strength and heat dissipation of a reference plane and excellent in productivity, and to provide a method for manufacturing the same.

In order to achieve the above object, there is provided a semiconductor laser apparatus comprising: a base frame; a laser device mounting frame extensively disposed on one side of the base frame; and a lead frame extensively disposed on the other side of the base frame, all structured by one metal plate, wherein

- the laser device mounting frame and the lead frame are bended so as to be opposite to each other against a plane of the base frame,
- the base frame functions as a reference plane and a heat sinking base,
- a semiconductor laser device is mounted on the laser device mounting frame, and
- the lead frame becomes a lead terminal.

According to the above structure, the base frame functioning as a reference plane and as a heat sinking base is formed by bending a laser device mounting frame and a lead frame, which are structured together with the base from one metal plate, so that the laser device mounting frame and the lead frame are opposite to each other against the base frame. Therefore, the area of the reference plane and the heat sinking plane may be arbitrarily set by changing the bending position. This provides the frame type laser apparatus with high heat dissipation competing with that of Φ5.6 can type laser apparatus.

Further, since the apparatus is a frame type laser apparatus, structuring plural sets of the laser device mounting frame, the base frame, and the lead frame in a multiple form enables collective packaging in large quantities, resulting in increase of productivity. Further, manufacturing of a final product may be performed in a multiple form, which enables further increase of productivity and enables manufacturing at low costs.

In one embodiment of the present invention, a configuration of the base frame is an approximate circle or an approximate oval partially in a shape of a circular arc.

According to this embodiment, the configuration of the base frame is an approximate circle or an approximate oval shape, which may provide strength and heat dissipation competing with those of the stem in the Φ5.6 can type laser apparatus.

In one embodiment of the present invention, an optical axis of laser light from the semiconductor laser device mounted on the laser device mounting frame has an extension line traveling through an approximate center of the configuration of the base frame.

According to this embodiment, in addition to the fact that a configuration of the base frame is an approximate circle or partially a circular arc, the optical axis is not displaced when a mounting position is adjusted by rotating the base frame, which considerably simplifies adjustment of a mounting position.

In one embodiment of the present invention, at least a portion of the base frame to be the reference plane and the heat sinking base has an increased thickness.

According to this embodiment, a portion to be the reference plane and the heat sinking base has an increased thickness. This implements further increase of the strength and the heat dissipation of the reference plane.

In one embodiment of the present invention, on the base frame, there is formed a component protecting partition made of resin so as to surround the semiconductor laser device excluding a laser emitting side.

According to this embodiment, there is formed a component protecting partition so as to surround the semiconductor laser device. Therefore, though the apparatus is an open package, the semiconductor laser device, the wire, and the like are protected from careless touch. Further, the component protecting partition is structured not from a cap but a resin, so that collective packaging in large quantities is achieved.

In one embodiment of the present invention, the resin structuring the component protecting partition is formed with at least part of the laser device mounting frame and the lead frame being embedded therein, and the laser device mounting frame and the lead frame bended toward the base frame are fixed by the resin.

According to this embodiment, at least part of the laser device mounting frame and the lead frame are fixed by the resin. Consequently, the laser device mounting frame and the lead frame structured by bending one metal plate is free from flexion and the like, which may increase mounting rigidity.

In one embodiment of the present invention, a top end portion of the separated lead frame is inserted into the resin that constitutes the component protecting partition, and the top end portion is equipped with slip out preventing means for preventing slip out of the lead frame from the resin.

According to this embodiment, the lead frame electronically separated from the lead frame integrally formed with the base frame is fixed to a resin block of the component protecting partition. This increases mounting rigidity.

In one embodiment of the present invention, a positioning recess portion is provided on an outer circumferential edge of the base frame.

According to this embodiment, positioning for adjusting a mounting position by rotating the base frame is easily performed with the positioning recess portion on an outer circumferential edge.

In one embodiment of the present invention, the base frame, the laser device mounting frame and the lead frame that are formed integrally are formed from a copper plate or an iron plate whose surface is plated with gold or silver.

According to this embodiment, the base frame, the laser device mounting frame and the lead frame that are integrated are formed from a conductive metal plate made of copper or iron. This enables the lead frame to function as a lead terminal as it is. Further, plating the surface with gold or silver implements good wire-bonding of the semiconductor laser device to the lead frame.

Also, there is provided a method for manufacturing a semiconductor laser apparatus comprising the steps of:

forming plural groups of frames connected by a casing frame and a tie-bar from one metal plate, the group composed of a base frame, a laser device mounting frame extensively disposed on one side of the base frame, a first lead frame extensively disposed on the other side of the base frame, and a second frame separated from the first lead frame;

bending the laser device mounting frame and the first lead frame in each group so as to be opposite to each other against the base frame;

mounting the semiconductor laser device on the laser device mounting frame in each group, and then wire-bonding the semiconductor laser device to the first and second lead frames; and

forming a component protecting partition from resin on the base frame in each group so as to surround the semiconductor laser device excluding a laser emitting side.

According to the above method, plural groups of frames consisting of a laser device mounting frame, a base frame, first and second frames connected via a casing frame and a tie-bar are formed from one metal plate, and each group simultaneously undergoes the steps of forming, mounting of a semiconductor laser device, wire-bonding, and resin-molding. This enables collective mass production of a plurality of semiconductor laser apparatuses having high strength and heat dissipation of the reference plane in the form of final products, thereby implementing increase of productivity and reduction of costs.

In one embodiment of the present invention, forming of frames from one metal plate is conducted by stamping with use of a mold.

According to this embodiment, forming of the frames becomes easier and productivity is further increased.

In one embodiment of the present invention, the method further comprises the step of providing a groove in a bending portion of each frame in advance of the step of bending the laser device mounting frame and the first lead frame.

According to this embodiment, bending of the laser device mounting frame and the first lead frame in the forming process is simplified, which implements further increase of productivity.

In one embodiment of the present invention, bending of the laser device mounting frame and the first lead frame is conducted with use of a mold.

According to this embodiment, bending of the laser device mounting frame and the first lead frame in a plurality of groups is collectively conducted with use of a mold, which implements increase of productivity.

In one embodiment of the present invention, the method further comprises the step of attaching a metal plate to at least a portion of the base frame to be a reference plane and a heat sinking base, the metal plate having a form identical to the portion.

According to this embodiment, a portion to be the reference plane and the heat sinking base is given an increased thickness. This further increases strength and heat dissipation of the reference plane.

In one embodiment of the present invention, the method further comprises the step of decreasing a thickness of a portion other than the portion of the base frame to be the reference plane and the heat sinking base, a thickness of the laser device mounting frame, and a thickness of the first lead frame by pressing.

According to this embodiment, processing for increasing the thickness in order to increase strength and heat dissipation of the reference plane for plural groups of frames is achieved by one operation of pressing. Therefore, productivity is increased more than the case of attaching a metal plate as shown in the antecedent embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given hereinbelow and the

accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

FIGS. **1**A to **1**C are views of a semiconductor laser apparatus of the present invention;

FIGS. **2**A and **2**B are views showing the form of a frame of the semiconductor laser apparatus shown in FIG. **1**;

FIG. **3** is a side view showing the frame after forming;

FIGS. **4**A and **4**B are views showing the frame being resin-molded;

FIG. **5** is a view showing a conventional frame type laser apparatus having a metal reference plane;

FIG. **6** is a view showing a conventional frame type laser apparatus having a resin reference plane; and

FIG. **7** is a view showing a conventional Φ5.6 can type laser apparatus.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinbelow, the present invention will be described in detail on the basis of the embodiment shown in the drawings. FIG. **1**A is a plane view, FIG. **1**B is a front view, and FIG. **1**C is a bottom view.

This semiconductor laser apparatus, which may be compatible with a Φ5.6 can type laser apparatus of FIG. **7** that is currently a mainstream apparatus, has a reference plane with increased strength and heat dissipation that used to be difficult to achieve in frame type laser apparatuses. Also, though in the form of an open package without use of a cap, the apparatus is equipped with a component protecting partition for protecting a mounted laser device, wires and the like, which implements a structure protected from careless touch.

Reference numeral **21** denotes a base frame composed of approximately semilunar reference plane portions **21**_a_, **21**_b_ disposed so as to be opposed to each other, one side of which is in the shape of a circular arc, and a plate-shaped connecting portion **21**_c_ for connecting the center of the straight other sides of the both reference plane portions **21**_a_, **21**_b_, the base frame being formed from one metal plate. Also, a plate-shaped laser device mounting frame **22** is extensively provided from one side portion of the connecting portion **21**_c_ of the base frame **21** in vertical direction against the surface of the connecting portion **21**_c_. From the other side portion of the connecting portion **21**_c_, three lead frames **23** are extensively provided in vertical direction against the surface of the connecting portion **21**_c_. Here, the laser device mounting frame **22** and a central lead frame **23**_a_ are structured such that they are integrally formed with the base frame **21**, and bended at a side edge of the connecting portion **21**_c_ at right angles so as to be opposite to each other. More specifically, the laser device mounting frame **22**, the base frame **21**, and the lead frame **23**_a_ are structured by stamping and bending one metal plate.

Also, to the reference plane portions **21**_a_, **21**_b_ of the base frame **21**, there are attached metal plates **24**, **24** having the same form for heat dissipation and reinforcement.

On the laser device mounting frame **22**, there is mounted a submount **25** on which a laser device **26** and a light receiving device **40** are mounted, and the submount **25** is wire-bonded to wire-bonding portions **28**, **28** of the lead frames **23**, **23** by wires **27**, **27**. The surrounding of the laser device mounting frame **22** with the laser device **26** mounted thereon except the laser light emitting side is molded by a mold resin **29** as shown with a slanted line. Thus, the mold resin **29** constitutes the component protecting partition. It is noted that reference numeral **30** denotes a positioning recess portion formed on the outer circumferential edge of the base frame **21**.

As described above, the semiconductor laser apparatus according to the present embodiment has the base frame **21**, the laser device mounting frame **22**, and the lead frame **23** formed by stamping and bending of one metal plate, and the laser device **26** is mounted on the laser device mounting frame **22**. A reference plane is constituted by the reference plane portions **21**_a_, **21**_b_ of the base frame **21** formed from one plane metal plate in the shape of an approximate oval a part of which is circular arc. Further, to the reference plane portions **21**_a_, **21**_b_, the metal plates **24**, **24** having the form identical thereto are attached for heat dissipation and reinforcement. Therefore, though it is a frame type laser device, the semiconductor laser apparatus may obtain high reference plane strength and heat dissipation competing with the stem in the Φ5.6 can type laser apparatus. Also, the strength and the heat dissipation may be freely changed by changing a stamping form of the base frame **21** and a bending position of the laser device mounting frame **22** and the lead frame **23**.

Although the semiconductor laser apparatus of the present invention is a frame type laser device formed by stamping out a frame from one metal plate, the overall form of a finished product is in the shape identical to the Φ5.6 can type laser apparatus as shown in FIG. **1**. This enables the semiconductor laser apparatus to have compatibility with the Φ5.6 can type laser apparatus shown in FIG. **7**.

Further, in the semiconductor laser apparatus in the present embodiment, the surrounding of the laser device **26** mounted on the laser device mounting frame **22** except the light emitting side is surrounded with the mold resin **29** that forms a component protecting partition. Consequently, although the overall form of the semiconductor laser apparatus is identical to the Φ5.6 can type laser apparatus, a cap for protecting the laser device and the wire in the Φ5.6 can type laser apparatus is unnecessary, and molding with resin enables mass production.

The semiconductor laser apparatus in the present invention is structured, as described above, such that the base frame **21**, the laser device mounting frame **22** extensively provided from the connecting portion **21**_c_ of the base frame **21** to one side direction, and the lead frame **23**_a_ extensively provided from the connecting portion **21**_c_ to the other side direction are stamped out from one metal plate and bended. Therefore, the apparatus may be collectively produced in large quantities by the manufacturing steps identical to those in the case of the frame type laser apparatus. Hereinbelow, detailed description will be given of a method for manufacturing the semiconductor laser apparatus.

First, a plate material of the frame (mainly Cu and Ce) is stamped out to obtain a necessary form (including a positioning recess portion **30**, and a slip out preventing step portion **33**) as shown in FIG. **2**. In FIG. **2**, FIG. **2**A is a side view showing a stamped frame, while FIG. **2**B is a plane view showing the stamped frame.

In FIG. **2**, two casing frames **31**, **32** are disposed in parallel, and one end of a laser device mounting frame **22** extensively provided from a base frame **21** in one side direction is connected to one casing frame **31**. Further, one end of a lead frame **23**_a_ extensively provided from the base frame **21** in the other side direction is connected to the other casing frame **32**. From the casing frame **32**, there are extensively provided two lead frames **23**, **23** on the both sides of the lead frame **23**_a_ in parallel to the lead frame **23**_a_.

In wire-bonding portions **28, 28** at the lower side of the top end portion of these two lead frames **23, 23**, there is provided a slip out preventing step portion **33** for preventing the frames from slipping out of a mold resin **29** in which the frames are embedded later.

Plural sets of the laser device mounting frame **22**, the base frame **21**, and the lead frames **23**, **23***a*, **23** are provided together and formed in the state of being connected to two casing frames **31**, **32**. The laser device mounting frame **22** of each set is connected to each other by a tie-bar **34** for reinforcement. Similarly, the lead frame **23***a* and the lead frames **23**, **23** in every set, as well as the lead frames **23**, **23***a*, **23** of each set are connected to each other by a tie-bar **35** for reinforcement.

In the frame stamped in the above form, the laser device mounting frame **22** is bended as described above in the position of a broken line **36** going through a border between the laser device mounting frame **22** and the base frame **21**. Similarly, the lead frame **23***a* is bended as described above in the position of a broken line **37** going in the vicinity of the slip out preventing step portion **33** of the lead frames **23**, **23**. In this case, reference plane portions **21***a*, **21***b* of the base frame **21** are remained flat without being bended.

In the above-described stamping process, in the bending position of the laser device mounting frame **22** and the lead frame **23***a*, there are provided a shallow V groove **38** and V groove **39** having V-shaped cross section along the broken lines **36**, **37** on the face opposite to each other by means of a mold for smooth operation of later frame forming. Also, the surface of the frame is plated with gold or silver for achieving good wire-bonding after completion of the stamping process. If further improve of heat dissipation and reference plane strength is necessary, metal plates **24**, **24** for heat dissipation and reinforcement having the form identical to the reference plane portions **21***a*, **21***b* are attached to the reference plane portions **21***a*, **21***b* of the base frame **21** with adhesives after the plating process.

After the frame are plated and the metal plates **24**, **24** for heat dissipation and reinforcement are attached thereto as described above, there is performed forming process for forming the frames into a specified form through bending with use of a forming mold and the like. As a result, as shown in FIG. **3**, the laser device mounting frame **22** is bended 90 degrees from the V groove **38** formed on the border between the laser device mounting frame **22** and one side edge of the connecting portion **21***c* of the base frame **21** with the V groove **38** as a folding valley. Similarly, the lead frame **23***a* is bended 90 degrees to the side opposite to the laser device mounting frame **22** from the V groove **39** formed on the border between the lead frame **23***a* and the other side edge of the connecting portion **21***c* with the V groove **39** as a folding valley. In this case, the reference plane portions **21***a*, **21***b* of the base frame **21** are remained flat.

It is noted that the forming process is performed such that in mounting a laser device **26** after completion of the forming process, an optical axis of light from the laser device **26** has an extension line traveling through an approximate center of the configuration of the base frame **21**. More specifically, the forming process is performed so that the position of a laser emitting point in the plane view is the central position of the configuration of the approximately oval-shaped base frame **21** that is partially in the shape of a circular arc (see FIG. **1**A). Consequently, when the base frame **21** is rotated to adjust mounting position (laser light emitting direction), the optical axis will not displace, which is advantageous for the apparatus.

After that, the laser device **26** and a light receiving device **40** are mounted on the laser device mounting frame **22**, and wire-bonded to the wire-bonding portions **28**, **28** that form the slip out preventing step portion **33** in the top end portion of the two lead frames **23, 23** positioned outside and to the laser device mounting frame **22**. Then, as shown in FIG. **4**, the surrounding of the laser device **26** (omitted in FIG. **4**) except the emitting side is molded with a mold resin **29** to form a component protecting partition for protecting the laser device **26**, the wire **27**, and the like. Here, the mold resin **29** is formed as shown in FIG. **1** with part of the laser device mounting frame **22** and the lead frame **23** being embedded therein so as to fix the bended laser device mounting frame **22** and the lead frame **23**. Further, the slip out preventing step portion **33** provided in the top edge portion of the lead frame **23** secures the lead frame **23** so that the lead frame **23** does not slip out of the mold resin **29**.

As described above, plural sets of the laser device mounting frame **22**, the base frame **21**, and the lead frame **23** are disposed parallelly and integrally with two casing frames **31**, **32** disposed in parallel, and formed by stamping from one metal plate. Therefore, the later steps of forming, mounting of the laser device **26**, wire-bonding, and resin molding may be performed simultaneously for plural sets, which enables collective mass production.

It is noted that in the above embodiment, to the reference plane portions **21***a*, **21***b* of the base frame **21**, there are attached the metal plates **24**, **24** having the same form for securing strength and heat dissipation of the reference plane. However, stamping may be conducted with use of a metal plate having a thickness equal to the sum of the thickness of the base frame **21** and the thickness of the metal plates **24**, **24**. In this case, in the stamping process, the laser device mounting frame **22**, the connecting portion **21***c* of the base frame **21**, and the lead frame **23** are rolled out by pressing. Alternatively, V grooves **38**, **39** may be formed after the stamping process, and in the process of forming the V grooves **38**, **38**, the laser device mounting frame **22**, the connecting portion **21***c* of the base frame **21**, and the lead frame **23** may be rolled out.

This invention is for parallelly disposing plural sets of the laser device mounting frame **22**, the base frame **21**, and the lead frame **23** integrally with the casing frames **31**, **32** and stamping them from one metal plate. Then, the laser device mounting frame **22** is bended 90 degrees against the base frame **21** in one direction, while the lead frame **23** is bended 90 degrees on the opposite side of the laser device mounting frame **22** to form flat reference plane portions **21***a*, **21***b* in the base frame **21**. Then, the laser device **26** is mounted on the laser device mounting frame **22** and molded with resin.

Therefore, as long as the above structure is provided, the specific form of the laser device mounting frame **22**, the base frame **21** and the lead frame **23**, the number of the lead frames, the disposition, form, and number of the casing frame, the form of the mold resin **29**, the form of the entire frame are not limited to the above embodiment.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

What is claimed is:

1. A semiconductor laser apparatus, comprising:

base frame;

laser device mounting frame extensively disposed on one side of the base frame; and a first lead frame exten-

sively disposed on the other side of the base frame, structured by one metal plate, wherein

the laser device mounting frame and the first lead frame are rectangularly bent relative to a plane of the base frame so as to be opposite to each other against the plane of the base frame,

the base frame is configured as a reference plane and a heatsink base, a semiconductor laser device is mounted on the laser device mounting frame, and the first lead frame becomes a lead terminal.

2. The semiconductor laser apparatus as defined in claim **1**, wherein

a configuration of the base frame is an approximate circle or an approximate oval partially in a shape of a circular arc.

3. The semiconductor laser apparatus as defined in claim **2**, wherein

an optical axis of laser light from the semiconductor laser device mounted on the laser device mounting frame has an extension line traveling through an approximate center of the configuration of the base frame.

4. The semiconductor laser apparatus as defined in claim **1**, wherein

at least a portion of the base frame to be the reference plane and the heatsink base has an increased thickness.

5. The semiconductor laser apparatus as defined in claim **1**, wherein

the base frame further comprises a resin component protecting partition so as to surround the semiconductor laser device excluding a laser emitting side.

6. The semiconductor laser apparatus as defined in claim **5**, wherein

the resin structuring the component protecting partition is formed with at least part of the laser device mounting frame and the first lead frame being embedded therein, and the laser device mounting frame and the first lead frame bent toward the base frame are fixed by the resin.

7. The semiconductor laser apparatus as defined in claim **5**, further comprising a second lead frame formed separately from the first lead frame that is integrally formed with the base frame, wherein

a top end portion of the second lead frame is inserted into the resin that constitutes the component protecting partition, and the top end portion is equipped with a slip out preventing device for preventing slip out of the second lead frame from the resin.

8. The semiconductor laser apparatus as defined in claim **1**, wherein

a positioning recess portion is provided on an outer circumferential edge of the base frame.

9. The semiconductor laser apparatus as defined in claim **1**, wherein

the base frame, the laser device mounting frame and the first lead frame are formed from a copper plate or an iron plate having a surface plated with gold or silver.

10. A method for manufacturing a semiconductor laser apparatus, comprising;

forming plural groups of frames connected by at least a casing frame, the group composed of a base frame, a laser device mounting frame extensively disposed on one side of the base frame, a first lead frame extensively disposed on the other side of the base frame, and a second frame separated from the first lead frame;

rectangularly bending the laser device mounting frame and the first lead frame in each group relative to the base frame so as to be opposite to each other against the base frame;

mounting the semiconductor laser device on the laser device mounting frame in each group, and then wire-bonding the semiconductor laser device to the first and second lead frames; and

forming a component protecting partition from resin on the base frame in each group so as to surround the semiconductor laser device excluding a laser emitting side.

11. The method for manufacturing a semiconductor laser device as defined in claim **10**, wherein forming of frames from one metal plate is conducted by stamping with use of a mold.

12. The method for manufacturing a semiconductor laser device as defined in claim **10**, further comprising the step of providing a groove in a bending portion of each frame in advance of the step of bending the laser device mounting frame and the first lead frame.

13. The method for manufacturing a semiconductor laser device as defined in claim **10**, wherein

bending of the laser device mounting frame and the first lead frame is conducted with use of a mold.

14. The method for manufacturing a semiconductor laser device as defined in claim **10**, further comprising the step of attaching a metal plate to at least a portion of the base frame to be a reference plane and a heatsink base, the metal plate having a form identical to the portion.

15. The method for manufacturing a semiconductor laser device as defined in claim **10**, further comprising the step of decreasing a thickness of a portion other than the portion of the base frame to be the reference plane and the heatsink base, a thickness of the laser device mounting frame, and a thickness of the first lead frame by pressing.

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